

**Supplementary Information Data Table 1. Primers used in this study**

Construction of His-BACOVA_04502	forward	GGCGGGATCCATGAAGATAAATAAAATTCCTTAATAAGCGG
	reverse	CTAGACGCGTTATATTACATTATCTAAGCGCTAAGAAATAGATC
Construction of His-BACOVA_04503	forward	CTTAGGATCCCTTTCTTAGCGCTTAGATAATGTAATATATTC
	reverse	AGTAGGATCCCTTCTACTATGCTCACCTTATCAGATGA
Construction of <i>B. thetaiotaomicron</i> Δ3698	L flank Forw	GACTGGATCCCTAGGTTCTATGCTGGATACCGACT
	L flank Rev	GATAACGCGTGCATTGACAACCACAAAAGAGATA
	R flank Forw	CACCACGCGTAATACAGACAGCGACAGTTACACC
	R flank Rev	TTGAGGATCCATAAGAAATATCCCGATTTCGTTGA
	Screen forw	AATGTATATCTGATGGGCGATACC
	Screen rev	GATAGAAACCGGAAAAAGTCAAGA
	Int scr forw	TACTACTGGACTGGAGCAACG
	Int scr rev	CAGTCGGTGCAGAAATGAGA
Construction of <i>B. thetaiotaomicron</i> Δ1760	L flank Forw	TTGGGGATCCACTTACAACGGTAACCTGAATTGG
	L flank Rev	GGTAGAATTCCTCAGTGCGGTAAATGCTATAGGTA
	R flank Forw	GCACGAATTCGTATCAGACGTTTCAGGTAAGCAC
	R flank Rev	CTGAGGATCCCTGAGTAACACGGTTTTCTTCTGA
	Screen forw	CTGCCGACTACTATCACTACAACG
	Screen rev	GAAAGGTCTACCGGAACAAAAGTAA
Construction of <i>B. ovatus</i> Δ04502	L flank Forw	AGTTGAATTCCTTTCTTACCCAGTCAGAACTTGA
	L flank Rev	ACTTACGCGTTCGCTTATTAAGAATTTATTTATCTTCA
	R flank Forw	CTAGACGCGTTATATTACATTATCTAAGCGCTAAGAAATAGATC
	R flank Rev	CGAGGGATCCCTCCATAGGGAACAATAAAGAGC
Construction of <i>B. ovatus</i> Δ04503	L flank Forw	ACCGGAATTCGGAACAATTCCAAGTTTTATACCG
	L flank Rev	TGCTCCATGGGAACAACACAGACAGAAAGTGCT
	R flank Forw	TAATCCATGGAAACGCAGGAAGTCTCTAAT
	R flank Rev	ATCAGAATTCATCCAAAAATGAGAAAATCATCA
Construction of <i>B. ovatus</i> Δ04502/3	L flank Forw	ACCGGTCGACGGAACAATTCCAAGTTTTATACCG
	L flank Rev	TGCTACGCGTGAACAAACACAGACAGAAAGTGCT
	R flank Forw	GAAGACGCGTAAGATAATATTGTGCTCATGACGAAAG
	R flank Rev	CGGCGTCGACACGGTATTACTAACTTACCACGGC
	Screen forw	GCTCGCAAATTTAATTAACCGTAT
	Screen rev	TTCTATTTGTCCACCATGCAAAGAT
Construction of <i>B. ovatus</i> Δ04504	L flank Forw	TACTGGATCCAAGAGGTGGCTGACATACCTACT
	L flank Rev	CTGCGAATTCAAATAGTGCCATCACACCTACTGC
	R flank Forw	TCTCGAATTCCTCCAATGCACAATATAACTTCTC
	R flank Rev	TCTTGGATCCAGGAAGCTTTTTTCATCATCATCTT
Construction of <i>B. ovatus</i> Δ04505	L flank Forw	ATTGGAATTCCTCTAAATGGGGAAATATGCATTG
	L flank Rev	CGCTACGCGTAAAAGTAAACAGGAAACAAAACGCT
	R flank Forw	GGTACGCGTAACTCGTACCTATACATTCGGTC
	R flank Rev	ATCAGAATTCATTAATATTCTCGCCACCAATCA
Construction of <i>B. ovatus</i> Δ04504/5	L flank Forw	ATTGGGATCCCTCTAAATGGGGAAATATGCATTG
	L flank Rev	CGCTGAATTCGAAAGTAAACAGGAAACAAAACGCT
	R flank Forw	TCTCGAATTCCTCCAATGCACAATATAACTTCTC
	R flank Rev	TCTTGGATCCAGGAAGCTTTTTTCATCATCATCTT
Clone BACOVA_04502 native	forward	TATTGGATCCAACCTCCTCAACATACACCATTATT
	reverse	TCAAGGATCCAGTTACACCTATCACTTTTGTTCAA
Clone BACOVA_04503 native	forward	AGTTGGATCCAGAATCCCGGATACGGTAAAGTT
	reverse	GAAAGGATCCCTTAATAATGGTGTATGTTGAGGAGG
Clone BACOVA_04502/3 native	forward	TGAAGGATCCAGAATCCCGGATACGGTAAAGT
	reverse	GCGAGGATCCAAAATGTTACCGATCTATTTCTTAGCG
Clone BACOVA_04504 native	forward	CAGAGGTACCTGGTTTTTAATTTTTATCCTAAATACAGA
	reverse	TTACAGGTACCTGCTAAGCAAATATCTTTTTATTTTCA
Clone BACOVA_04505 native	forward	TCGTGGATCCCTGCATCATCGATATAGTAAAATTCGT
	reverse	TAGGGGATCCCTTCAATTTTCATAATGTTCTGTATTTAG
Clone BACOVA_04504/5 native	forward	TCGTGGTACCTGCATCATCGATATAGTAAAATTCGT
	reverse	TTCAGGTACCTGCTAAGCAAATATCTTTTTATTTTCA

Restriction sites are underlined